WHAT WE CLAIM IS:

1.   A zoom lens system comprising, in order from an object side of said zoom lens system, a first lens group having positive refracting power and designed to be fixed
5   during zooming, a second lens group having negative refract-ing power and designed to move from the object side to an image plane side of the zoom lens system for zooming from a wide-angle end to a telephoto end of said zoom lens system, a third lens group having positive refracting power and
10   designed to move from the image plane side to the object side for zooming from the wide-angle end to the telephoto end, and a fourth lens group having positive refracting power and designed to be movable for zooming, wherein the following conditions are satisfied:

15
$$0.5 < |F_2/F_3| < 1.2 \qquad \cdots (1)$$
$$2.5 \text{ mm} < f_{B(min)} < 4.8 \text{ mm} \qquad \cdots (10)$$

where F_i is a focal length of an i-th lens group and $f_{B(min)}$ is a length, as calculated on an air basis, of a final surface of a lens having power in said zoom lens system to an image
20   plane of said zoom lens system, representing a figure at which said zoom lens system becomes shortest in a whole zooming space.

2.   A zoom lens system comprising, in order from an object side of said zoom lens system, a first lens group
25   having positive refracting power and designed to be fixed during zooming, a second lens group having negative refract-ing power and designed to move from the object side to an image plane side of said zoom lens system for zooming from a

wide-angle end to a telephoto end of said zoom lens system, a

third lens group having positive refracting power and

designed to move from the image plane side to the object side

for zooming from the wide-angle end to the telephoto end, and

5   a fourth lens group having positive refracting power and

designed to be movable for zooming, wherein the following

conditions are satisfied:

$$0.49 < |L_3/L_2| < 1 \qquad \cdots (2)$$

$$2.5 \text{ mm} < f_{B(min)} < 4.8 \text{ mm} \qquad \cdots (10)$$

10   where L_i is an amount of movement of an i-th lens group from

the wide-angle end to the telephoto end and $f_{B(min)}$ is a

length, as calculated on an air basis, of a final surface of

a lens having power in said zoom lens system to an image

plane of said zoom lens system, representing a figure at

15   which said zoom lens system becomes shortest in a whole

zooming space.

3.   A zoom lens system comprising, in order from an

object side of said zoom lens system, a first lens group

having positive refracting power and designed to be fixed

20   during zooming, a second lens group having negative refract-

ing power and designed to move from the object side to an

image plane side of said zoom lens system for zooming from a

wide-angle end to a telephoto end of said zoom lens system, a

third lens group having positive refracting power and

25   designed to move from the object side to the image plane side

for zooming from the wide-angle end to the telephoto end, and

a fourth lens group having positive refracting power and

designed to be movable for zooming, wherein the following

conditions are satisfied:

$$2 < (F_{3.4W})/IH < 3.3 \qquad \cdots (3)$$

$$2.5 \text{ mm} < f_{B(min)} < 4.8 \text{ mm} \qquad \cdots (10)$$

5   where ($F_{3.4W}$) is a composite focal length of the third and

forth lens groups at the wide-angle end, IH is a radius of an

image circle, and $f_{B(min)}$ is a length, as calculated on an air

basis, of a final surface of a lens having power in said zoom

lens system to an image plane of said zoom lens system,

10   representing a figure at which said zoom lens system becomes

shortest in a whole zooming space.

4.   A zoom lens system comprising, in order from an

object side of said zoom lens system, a first lens group

having positive refracting power, a second lens group having

15   negative refracting power and designed to move from the

object side to an image plane side of said zoom lens system

for zooming a wide-angle end to a telephoto end of said zoom

lens system, a third lens group having positive refracting

power and a fourth lens group having positive refracting

20   power and designed to be movable for zooming, wherein said

third lens group comprises, in order from an object side

thereof, a positive lens component convex on an object side

thereof and a cemented lens consisting of a positive lens

element convex on an object side thereof and a negative lens

25   element concave on an image plane side thereof, and both the

object-side positive lens component and the cemented lens in

said third lens group are held in a lens barrel while the

object-side convex surfaces thereof abut peripherally or at

peripheral several spots against said lens barrel, and the following condition is satisfied:

$$2.5 \text{ mm} < f_{B(min)} < 4.8 \text{ mm} \qquad \cdots (10)$$

where $f_{B(min)}$ is a length, as calculated on an air basis, of a

5   final surface of a lens having power in said zoom lens system to an image plane of said zoom lens system, representing a figure at which said zoom lens system becomes shortest in a whole zooming space.

    5.   A zoom lens system comprising, in order from an

10   object side of said zoom lens system, a first lens group having positive refracting power and designed to be fixed during zooming, a second lens group having negative refracting power and designed to move from the object side to an image plane side of the zoom lens system for zooming from a

15   wide-angle end to a telephoto end of said zoom lens system, a third lens group having positive refracting power and designed to move from the image plane side to the object side for zooming from the wide-angle end to the telephoto end, and a fourth lens group having positive refracting power and

20   designed to be movable for zooming, wherein the following conditions are satisfied:

$$0.5 < |F_2/F_3| < 1.2 \qquad \cdots (1)$$

$$0.49 < |L_3/L_2| < 1 \qquad \cdots (2)$$

$$2.5 \text{ mm} < f_{B(min)} < 4.8 \text{ mm} \qquad \cdots (10)$$

25   where F_i is a focal length of an i-th lens group, L_i is an amount of an i-th lens group from the wide-angle end to the telephoto end, and $f_{B(min)}$ is a length, as calculated on an air basis, of a final surface of a lens having power in said zoom

lens system to an image plane of said zoom lens system, representing a figure at which said zoom lens system becomes shortest in a whole zooming space.

6.   A zoom lens system comprising, in order from an object side of said zoom lens system, a first lens group having positive refracting power and designed to be fixed during zooming, a second lens group having negative refracting power and designed to move from the object side to an image plane side of the zoom lens system for zooming from a wide-angle end to a telephoto end of said zoom lens system, a third lens group having positive refracting power and designed to move from the image plane side to the object side for zooming from the wide-angle end to the telephoto end, and a fourth lens group having positive refracting power and designed to be movable for zooming, wherein the following conditions are satisfied:

$$0.5 < |F_2/F_3| < 1.2 \qquad \cdots \ (1)$$

$$2 < (F_{3.4W})/IH < 3.3 \qquad \cdots \ (3)$$

$$2.5 \ mm < f_{B(min)} < 4.8 \ mm \qquad \cdots \ (10)$$

where F_i is a focal length of an i-th lens group, $(F_{3.4W})$ is a composite focal length of the third and forth lens groups at the wide-angle end, IH is a radius of an image circle, and $f_{B(min)}$ is a length, as calculated on an air basis, of a final surface of a lens having power in said zoom lens system to an image plane of said zoom lens system, representing a figure at which said zoom lens system becomes shortest in a whole zooming space.

7.   A zoom lens system comprising, in order from an object side of said zoom lens system, a first lens group having positive refracting power and designed to be fixed during zooming, a second lens group having negative refract-

5   ing power and designed to move from the object side to an image plane side of the zoom lens system for zooming from a wide-angle end to a telephoto end of said zoom lens system, a third lens group having positive refracting power and designed to move from the image plane side to the object side

10   for zooming from the wide-angle end to the telephoto end, and a fourth lens group having positive refracting power and designed to be movable for zooming, wherein the following conditions are satisfied:

$$0.49 < |L_3/L_2| < 1 \qquad \cdots (2)$$

15   $$2 < (F_{3.4w})/IH < 3.3 \qquad \cdots (3)$$

$$2.5 \text{ mm} < f_{B(min)} < 4.8 \text{ mm} \qquad \cdots (10)$$

where L_i is an amount of movement of an i-th lens group, $(F_{3.4w})$ is a composite focal length of the third and forth lens groups at the wide-angle end, IH is a radius of an image

20   circle, and $f_{B(min)}$ is a length, as calculated on an air basis, of a final surface of a lens having power in said zoom lens system to an image plane of said zoom lens system, representing a figure at which said zoom lens system becomes shortest in a whole zooming space.

25   8.   A zoom lens system comprising, in order from an object side of said zoom lens system, a first lens group having positive refracting power and designed to be fixed during zooming, a second lens group having negative refract-

ing power and designed to move from the object side to an
image plane side of the zoom lens system for zooming from a
wide-angle end to a telephoto end of said zoom lens system, a
third lens group having positive refracting power and

5   designed to move from the image plane side to the object side
for zooming from the wide-angle end to the telephoto end, and
a fourth lens group having positive refracting power and
designed to be movable for zooming, wherein the following
conditions are satisfied:

10
$$0.5 < |F_2/F_3| < 1.2 \qquad \cdots (1)$$
$$0.49 < |L_3/L_2| < 1 \qquad \cdots (2)$$
$$2 < (F_{3.4W})/IH| < 3.3 \qquad \cdots (3)$$
$$2.5 \text{ mm} < f_{B(min)} < 4.8 \text{ mm} \qquad \cdots (10)$$

where F_i is a focal length of an i-th lens group, L_i is an

15 amount of movement of an i-th lens group, $(F_{3.4W})$ is a
composite focal length of the third and forth lens groups at
the wide-angle end, IH is a radius of an image circle, and
$f_{B(min)}$ is a length, as calculated on an air basis, of a final
surface of a lens having power in said zoom lens system to an

20 image plane of said zoom lens system, representing a figure
at which said zoom lens system becomes shortest in a whole
zooming space.

    9.   The zoom lens system according to any one of claims
1, 2, 3, and 5 to 8, which further satisfies the following

25 condition:

$$0.6 < |F_2/F_3| < 1 \qquad \cdots (4)$$

where F_i is the focal length of an i-th lens group.

10.   The zoom lens system according to any one of claims 1, 2, 3, and 5 to 8, wherein said fourth lens group is moved in an optical axis direction for focusing.

11.   The zoom lens system according to any one of claims 1, 2, 3, and 5 to 8, which further satisfies the following condition:

$$0.3 < |F_3/F_4| < 0.8 \qquad \cdots (5)$$

where F_i is the focal length of an i-th lens group.

12.   The zoom lens system according to any one of claims 1, 2, 3, and 5 to 8, which further satisfies the following condition:

$$0.4 < |\beta_{2T}| < 1 \qquad \cdots (6)$$

where β_{2T} is a transverse magnification of the second lens group.

13.   The zoom lens system according to any one of claims 1, 2, 3, and 5 to 8, wherein said fourth lens group consists of one positive lens element.

14.   The zoom lens system according to any one of claims 1, 2, 3, and 5 to 8, wherein said third lens group consists of three lenses elements or a positive lens element, a positive lens element and a negative lens element in order from an object side thereof.

15.   The zoom lens system according to any one of claims 1, 2, 3, and 5 to 8, wherein at least one surface in said third lens group is defined by an aspherical surface.

16.   The zoom lens system according to any one of claims 1, 2, 3, and 5 to 8, wherein at least one surface in said fourth lens group is defined by an aspherical surface.

17.   The zoom lens system according to any one of claims 1, 2, 3, and 5 to 8, wherein at least one surface in said second lens group is defined by an aspherical surface.

18.   A zoom lens system comprising, in order from an

5   object side of said zoom lens system, a first lens group having positive refracting power and designed to be fixed during zooming, a second lens group having negative refracting power , and designed to move from the object side to an image plane side of the zoom lens system for zooming from a

10   wide-angle end to a telephoto end of said zoom lens system, a third lens group having positive refracting power and designed to move from the image plane side to the object side for zooming from the wide-angle end to the telephoto end, and a fourth lens group having positive refracting power and

15   designed to be movable for zooming, wherein said first lens group consists of one positive lens element, a lens element located nearest to the object side in said second lens group is defined by a negative lens element, and the following conditions are satisfied:

20                                    $\nu_{21} < 40$ $\cdots$ (7)

2.5 mm < $f_{B(min)}$ < 4.8 mm $\cdots$ (10)

where ν_{21} is an Abbe's number of said negative lens element located nearest to the object side in said second lens group, and $f_{B(min)}$ is a length, as calculated on an air basis, of a

25   final surface of a lens having power in said zoom lens system to an image plane of said zoom lens system, representing a figure at which said zoom lens system becomes shortest in a whole zooming space.

19.   The zoom lens system according to claim 18, which satisfies the following condition:

$$\nu_{21} < 35 \qquad \cdots (8)$$

20.   The zoom lens system according to any one of claims 1, 2, 3, and 5 to 8, wherein a lens element located nearest to the object side in said second lens group is defined by a negative lens element, and the following condition is satisfied:

$$\nu_{21} < 40 \qquad \cdots (7)$$

where ν_{21} is an Abbe's number of said negative lens element located nearest to the object side in said second lens group.

21.   The zoom lens system according to claim 20, which satisfies the following condition:

$$\nu_{21} < 35 \qquad \cdots (8)$$

where ν_{21} is the Abbe's number of said negative lens element located nearest to the object side in said second lens group.

22.   The zoom lens system according to any one of claims 1, 2, 3, 5 to 8, 18 and 19, wherein said third lens group comprises, in order from an object side thereof, a positive lens component convex on an object side thereof and a cemented lens consisting of a positive lens element convex on an object side thereof and a negative lens element concave on an image side thereof, and said cemented lens and said positive lens on the object side are held in a lens barrel while the peripheral edges of the convex surfaces thereof abut peripherally or at peripheral several spots against the lens barrel.

23.   A zoom lens system comprising, in order from an
object side of said zoom lens system, a first lens group
having positive refracting power and designed to be fixed
during zooming, a second lens group having negative

5   refracting power and designed to move from the object side to
an image plane side of said zoom lens system for zooming from
a wide-angle end to a telephoto end of said zoom lens system,
a third lens group having positive refracting power and
designed to move constantly from the image plane side to the

10   object side for zooming from the wide-angle end to the
telephoto end, and a fourth lens group having positive
refracting power and designed to be movable during zooming,
wherein said third lens group comprises a cemented lens
consisting of a positive lens element and a negative lens

15   element, said fourth lens group consists of one positive lens
element, and the following condition (10) is satisfied:

$$2.5 \text{ mm} < f_{B(min)} < 4.8 \text{ mm} \qquad \cdots (10)$$

where $f_{B(min)}$ is a length, as calculated on an air basis, of a
final surface of a lens having power in said zoom lens system

20   to an image plane of said zoom lens system, representing a
figure at which said zoom lens system becomes shortest in a
whole zooming space.

24.   The zoom lens system according to claim 23, wherein
at least one surface of said positive lens in said fourth

25   lens group is defined by an aspherical surface.

25.   A zoom lens system comprising, in order from an
object side of said zoom lens system, a first lens group
having positive refracting power and designed to be fixed

during zooming, a second lens group having negative
refracting power and designed to move from the object side to
an image plane side of said zoom lens system for zooming from
a wide-angle end to a telephoto end of said zoom lens system,

5   a third lens group having positive refracting power and
designed to move constantly from the image plane side to the
object side for zooming from the wide-angle end to the
telephoto end, and a fourth lens group having positive
refracting power and designed to be movable during zooming,

10   wherein said second lens group, and said third lens group
comprises a cemented lens consisting of a positive lens
element and a negative lens element, and the following
condition (10) is satisfied:

$$2.5 \text{ mm} < f_{B(min)} < 4.8 \text{ mm} \qquad \cdots (10)$$

15   where $f_{B(min)}$ is a length, as calculated on an air basis, of a
final surface of a lens having power in said zoom lens system
to an image plane of said zoom lens system, representing a
figure at which said zoom lens system becomes shortest in a
whole zooming space.

20   26.   A zoom lens system comprising, in order from an
object side of said zoom lens system, a first lens group
having positive refracting power and designed to be fixed
during zooming, a second lens group having negative
refracting power and designed to move from the object side to

25   an image plane side of said zoom lens system for zooming from
a wide-angle end to a telephoto end of said zoom lens system,
a third lens group having positive refracting power and
designed to move constantly from the image plane side to the

object side for zooming from the wide-angle end to the telephoto end, and a fourth lens group having positive refracting power and designed to be movable during zooming, wherein said third lens group comprises, in order from an

5 object side thereof, a positive lens component and a cemented lens consisting of a positive lens element and a negative lens element, and the following condition (10) is satisfied:

$$2.5 \text{ mm} < f_{B(min)} < 4.8 \text{ mm} \qquad \cdots (10)$$

where $f_{B(min)}$ is a length, as calculated on an air basis, of a

10 final surface of a lens having power in said zoom lens system to an image plane of said zoom lens system, representing a figure at which said zoom lens system becomes shortest in a whole zooming space.

27. A zoom lens system comprising, in order from an

15 object side of said zoom lens, a first lens group having positive refracting power, a second lens group having negative refracting power, a third lens group having positive refracting power and a fourth lens group having positive refracting power, wherein a spacing between said first lens

20 group and said second lens group, a spacing between said second lens group and said third lens group, and a spacing between said third lens group and said fourth lens group varies upon zooming, said third lens group comprises, in order from an object side thereof, a double-convex positive

25 lens component and a cemented lens consisting of a positive meniscus lens element convex on an object side thereof and a negative meniscus lens element, said fourth lens group comprises a double-convex lens element in which an object-

side surface thereof has a larger curvature, and the
following condition (10) is satisfied:

$$2.5 \text{ mm} < f_{B(min)} < 4.8 \text{ mm} \qquad \cdots (10)$$

where $f_{B(min)}$ is a length, as calculated on an air basis, of a
final surface of a lens having power in said zoom lens system
to an image plane of said zoom lens system, representing a
figure at which said zoom lens system becomes shortest in a
whole zooming space.

28. A zoom lens system comprising, in order from an
object side of said zoom lens, a first lens group having
positive refracting power, a second lens group having
negative refracting power, a third lens group having positive
refracting power and a fourth lens group having positive
refracting power, wherein a spacing between said first lens
group and said second lens group, a spacing between said
second lens group and said third lens group, and a spacing
between said third lens group and said fourth lens group
varies upon zooming, said first lens group consists of one
positive lens component, said second lens group comprises
three lens elements or one single lens element and a cemented
lens consisting of a negative lens element and a positive
lens element in order from an object side thereof, said third
lens group comprises three lens elements or a single lens
element and a cemented lens consisting of a positive lens
element and a negative lens element in order from an object
side thereof, said fourth lens group consists of one positive
lens element, and the following condition (10) is satisfied:

$$2.5 \text{ mm} < f_{B(min)} < 4.8 \text{ mm} \qquad \cdots (10)$$

where $f_{B(min)}$ is a length, as calculated on an air basis, of a final surface of a lens having power in said zoom lens system to an image plane of said zoom lens system, representing a figure at which said zoom lens system becomes shortest in a

5   whole zooming space.

       29. A zoom lens system comprising, in order from an object side of said zoom lens, a first lens group having positive refracting power, a second lens group having negative refracting power, a third lens group having positive

10   refracting power and a fourth lens group having positive refracting power, wherein a spacing between said first lens group and said second lens group, a spacing between said second lens group and said third lens group, and a spacing between said third lens group and said fourth lens group

15   varies upon zooming, said first lens group comprises two lens elements or a positive lens element and a negative lens element, said second or third lens group includes therein a cemented lens component consisting of at least one set of a positive lens element and a negative lens element, and the

20   following condition (10) is satisfied:

$$2.5 \text{ mm} < f_{B(min)} < 4.8 \text{ mm} \qquad \cdots \text{ (10)}$$

where $f_{B(min)}$ is a length, as calculated on an air basis, of a final surface of a lens having power in said zoom lens system to an image plane of said zoom lens system, representing a

25   figure at which said zoom lens system becomes shortest in a whole zooming space.

       30. A zoom lens system comprising, in order from an object side of said zoom lens system, a first lens group

having positive refracting power and designed to be fixed

during zooming, a second lens group having negative

refracting power and designed to move from the object side to

an image plane side of said zoom lens system for zooming from

5 a wide-angle end to a telephoto end of said zoom lens system,

a third lens group having positive refracting power and

designed to move constantly from the image plane side to the

object side for zooming from the wide-angle end to the

telephoto end, and a fourth lens group consists of one lens

10 element, having positive refracting power and designed to be

movable during zooming, wherein said second lens group, and

said third lens group comprises a cement lens component

consisting of a positive lens element and a negative lens

element, and said third lens group or said fourth lens group

15 includes therein at least one aspherical surface.

31. A zoom lens system comprising, in order from an

object side of said zoom lens, a first lens group having

positive refracting power, a second lens group having

negative refracting power, a third lens group having positive

20 refracting power and a fourth lens group having positive

refracting power, wherein a spacing between said first lens

group and said second lens group, a spacing between said

second lens group and said third lens group, and a spacing

between said third lens group and said fourth lens group

25 varies upon zooming, said first lens group consists of one

positive lens element, said second lens group comprises three

lens elements or a single lens element and a cemented lens

consisting of a negative lens element and a positive lens

element in order from an object side thereof, said third lens

group comprises three lens elements or a single lens element

and a cemented lens consisting of a positive lens element and

a negative lens element, and said fourth lens element

5 consists of one positive lens element, with at least one

aspherical surface introduced in said third lens group or

said fourth lens group.

32.   The zoom lens system according to any one of claims

1 to 8, 18, 23 and 25 to 31, which further satisfies the

10   following condition:

$$2.5 \text{ mm} < f_{B(max)} < 4.8 \text{ mm} \qquad \cdots (11)$$

where $f_{B(max)}$ is a length, as calculated on an air basis, of a

final surface of a lens having power in said zoom lens system

to an image plane of said zoom lens system, representing a

15   figure at which said zoom lens system becomes longest in a

whole zooming space.

33.   An image pickup system including an objective

optical system comprising a zoom lens system as recited in

any one of claims 1 to 8, 18, 23 and 25 to 31, and an

20   electronic image pickup device located on an image side of

said zoom lens system.